



VIA pc-1 System Platform Architecture

Making Intrepid Computing a Reality



Enabling the Next One Billion

**VIA Technologies, Inc.
January 2006**



Index

Introduction.....	3
VIA pc-1 System Platform Architecture.....	4
Introduction	4
VIA pc-1 Intrepid Computing Reference Designs	4
VIA pc-1 System Platform Architecture Benefits.....	5
VIA pc-1 Processor Platforms	7
Introduction	7
VIA pc1000 Processor Platform	8
Introduction	8
Functionality & Performance	8
Energy Efficiency	9
VIA pc1500 Processor Platform	10
Introduction	10
Functionality and Performance	10
Energy Efficiency	11
VIA pc-1 Intrepid Computing Reference Designs	12
Introduction	12
VIA pc-1 Power Saving PC Reference Design	12
VIA pc-1 PHD Appliance Reference Design	13
VIA pc-1 Initiative: The Right Path for Enabling the Next Billion.....	13

Illustrations

Figure 1: VIA pc-1 System Platform Architecture	4
Figure 2: VIA pc-1 System Platform Architecture Deployment Scenarios	6
Figure 3: VIA pc1000 Processor Platform Performance Comparison	8
Figure 4: VIA pc1000 Processor Platform Power Draw Comparison	9
Figure 5: VIA pc1500 Processor Platform Performance Comparison	10
Figure 6: VIA pc1500 Processor Platform Power Draw Comparison	11
Figure 7: VIA Affordable PC Reference Design	12
Figure 8: VIA PHD Appliance Reference Design.....	13





Introduction

With its unrivaled experience and expertise in developing market-leading highly integrated energy-efficient x86 silicon components and platforms such as the VIA C3™ processor and VIA EPIA Mini-ITX Mainboard series, VIA has played a leadership role in creating innovative solutions optimized to meet the needs of Emerging Market users and has achieved considerable success in working with partners throughout the world to enable ground-breaking products such as the “HCL PC for India” – the first sub-10,000 rupee PC (US\$225 approx) in the Indian market.

Through the VIA pc-1 Initiative and its Intrepid Computing Vision, VIA is building on this initial success by creating a sustainable and highly scalable next generation VIA pc-1 System Platform Architecture that combines the traditional strengths of the industry standard x86 infrastructure, namely its unrivaled compatibility, flexibility, functionality, and economies of scale, with ultra low power consumption and rich levels of feature integration to take computing technologies beyond the traditional confines of the PC into new markets, new environments, new usage models, and new product categories.

As well as defining the overall system platform architecture for Intrepid Computing devices, the VIA pc-1 Initiative also features a comprehensive and flexible range of VIA pc-1 Processor Platforms and VIA pc-1 Intrepid Computing Reference Designs that can be adopted by OEMs and System Integrators for their target markets.

To ensure the effective global implementation of the VIA pc-1 Initiative, VIA is also working with key partners throughout the globe on the development of a comprehensive ecosystem that will solve the deployment challenges, drive innovation, and enable significant opportunities for local value-add in local and national economies.

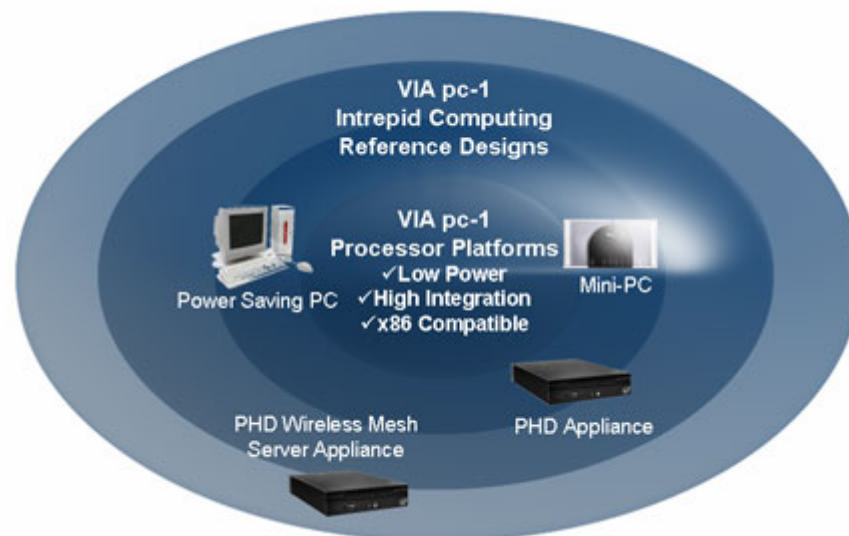
In addition to providing an overview of the VIA pc-1 System Platform Architecture, this White Paper describes the market-leading range of platforms and the new reference designs that VIA is developing as part of the VIA pc-1 Initiative as it works to achieve its Intrepid Computing Vision.

VIA pc-1 System Platform Architecture

Introduction

To meet the diverse requirements of Emerging Markets, the VIA pc-1 Initiative is focused on leveraging the flexibility, scalability and superior energy-efficiency of VIA's market-leading silicon and platform technologies to build a sustainable and highly scalable system platform architecture that will enable the rapid and cost effective development of a broad spectrum of Intrepid Computing devices, as shown in Figure 1 below.

Figure 1: VIA pc-1 System Platform Architecture



VIA pc-1 Intrepid Computing Reference Designs

Centered around the ultra low power, highly-integrated, and native x86 compatible VIA pc-1 Processor Platforms, the VIA pc-1 System Platform Architecture includes a growing number of VIA pc-1 Intrepid Computing Reference Designs that have been defined to meet the most common Emerging Market usage models based around Individual Ownership, Community Access, and Assisted Access.

Intrepid Computing devices and can be broken down into four broad categories, and their key applications and features are defined as follows:

- **Power Saving PCs:** Energy-efficient, full-featured general-purpose multimedia PCs that provide Emerging Market consumers, companies, schools, universities, and other organizations with a highly reliable complete system at prices ranging from \$300 to below \$250. Based on a choice of VIA pc-1 Series Processor Platforms, Power Saving PCs are equipped with a hard drive, 15" monitor, and a full set of connectivity and multimedia features, and can run all major operating systems and applications, including Microsoft® Windows® XP, Microsoft® Windows® XP Starter Edition, and popular versions of Linux.



- **Mini-PCs:** Designed to meet the growing demand among Emerging Market consumers for stylish yet robust and energy-efficient products that are small enough to fit in often space-constrained and crowded living environments, Mini-PCs will come with a full set of computing, connectivity, and digital media features – all integrated into a highly compact form factor.
- **PHD Appliances:** An entirely new category of devices that move one step beyond the traditional PC and optimize it for Community Access and Assisted Access usage scenarios such as schools, Internet Cafes, and Village Kiosks, combating the power, heat, dust and other environmental challenges prevalent in developing markets.

Powered by a choice of ultra low power VIA pc-1 Processor Platforms, PHD Appliances are extremely energy-efficient in order to minimize the burden on the electricity generation infrastructure and are designed to operate in areas where there are intermittent electricity supplies through the integration of support for a car battery, solar panels, and other alternative power sources. PHD Appliances are also designed to operate in the extreme ambient temperature ranges that are common in Emerging Markets, and have also been designed to protect against dust intrusion – a major cause of system failure in Emerging Market environments. To meet the diverse needs of Emerging Market Users, PHD Appliances are also “smart” in that they can be configured to a wide variety of different specifications and integrate support for local language software applications and connectivity services – thereby offering numerous value generation opportunities for local businesses.

- **PHD Server Appliances:** Further extending the functionality of PHD Appliances by providing optimized solutions for digital audio and video broadcasting stations in the harshest environments, PHD Server Appliances can also be used to set up wireless mesh networks and other last mile connectivity solutions in remote areas.

VIA pc-1 System Platform Architecture Benefits

The VIA pc-1 System Platform Architecture provides a very cost-effective and flexible architecture for the rapid development, deployment, and proliferation of affordable, energy-efficient Intrepid Computing devices for the most popular Emerging Market usage models based around Individual Ownership, Community Access, and Assisted Access.

The key benefits of this architecture can be summarized as follows:

- **Exponential Device Innovation:** By combining the unrivaled compatibility, flexibility, functionality, and economies of scale of the PC industry's standard x86 infrastructure with ultra low power consumption and rich integration, the VIA pc-1 System Platform Architecture provides a cost-effective and highly efficient way for Emerging Market OEMs and SIs to develop a broad range of Power Saving PCs, PHD Appliances, and PHD Appliance Servers specifically customized to meet the diverse needs of their target markets. By adopting



turnkey VIA Intrepid Computing Reference Designs, OEMs and SIs can further reduce development costs and speed up time to market.

- **Multiple Usage & Deployment Scenarios:** With its scalable design, the VIA pc-1 System Platform Architecture enables the deployment of Intrepid Computing devices in a wide variety of scenarios within the Individual Ownership, Community Access, and Assisted Access segments. These range from PCs for the home to school, office, Internet Café and other deployments, as illustrated in Figure 2 below.

Figure 2: VIA pc-1 System Platform Architecture Deployment Scenarios



- **Long Term Sustainability:** With their low power consumption and high levels of reliability, Intrepid Computing devices based on the VIA pc-1 System Platform Architecture not only deliver a reduced Total Cost of Ownership but also minimize the burden on the electricity generation infrastructures in Emerging Markets. PHD Appliances have been specifically designed to operate in even the harshest of environmental conditions and run off alternative power sources such as car and truck batteries.
- **Local Value Add:** The VIA pc-1 System Platform Architecture provides multiple opportunities for OEMs and SIs to add value through the development of unique, innovative products that can be easily differentiated in the market. Emerging Market entrepreneurs such as Internet Café and Village Kiosk operators can also benefit from the flexibility of the VIA pc-1 System Platform Architecture, by offering customized computing, entertainment, and communications services such as VoIP telephony and videoconferencing through the devices.



VIA pc-1 Processor Platforms

Introduction

At the heart of the VIA pc-1 System Platform Architecture are the VIA pc-1 Processor Platforms that have been optimized to meet the specific needs of Emerging Markets and deliver the following key benefits:

- **Energy Efficiency:** With their industry-leading low power consumption, VIA pc-1 Processor Platforms not only minimize the burden on the often limited electricity generation infrastructure in emerging and harsh environments, but can also operate in hostile environmental conditions where there is no air-conditioning. Additional innovations mean that devices based VIA pc-1 Processor Platforms can also be configured to run off car and truck batteries and even solar panels, making them ideal for deployment in even the remotest locations.
- **Rich Digital Media Performance:** With support for advanced 2D/3D graphics, MPEG-2 hardware acceleration, and multi-channel audio, VIA pc-1 Processor Platforms provide all the functionality and performance necessary to run a complete variety of computing, communications, and entertainment applications required by Emerging Market users, including VOIP telephony and videoconferencing, email, IM, and web browsing, productivity suites, and digital movies and music.
- **Software Compatibility:** With their native x86 instruction set, VIA pc-1 Processor Platforms are fully compatible with a complete range of Microsoft® Windows® and Linux operating systems and applications, providing unrivaled flexibility in meeting the specific software language needs of Emerging Market users.
- **Seamless Connectivity:** With their advanced connectivity features such as Fast Ethernet and USB 2.0, VIA pc-1 Processor Platforms can not only be connected to high-speed fixed and wireless¹ broadband networks, but can also be used to plug in a full range of digital cameras, digital video cameras, and other peripherals. Optional TV-Out support also means that VIA pc-1 Processor Platforms can be coupled with a TV as well as standard CRT and LCD monitors.
- **Durability & Scalability:** With their proven reliability and inherent flexibility, VIA pc-1 Processor Platforms provide a highly durable and scalable solution for deployment in wide variety of market usage scenarios, ranging from Internet Cafés and Village Kiosks to households, schools, government departments, and businesses.

¹ Requires WiFi card to enable wireless connectivity





VIA pc1000 Processor Platform

Introduction

The VIA pc1000 Processor Platform couples the VIA pc1000™ processor with the VIA CLE266 digital media chipset to provide an energy-efficient and feature-rich solution for building a wide range of Power Saving PCs, PHD Appliances, and PHD Appliance Servers for Emerging Markets.

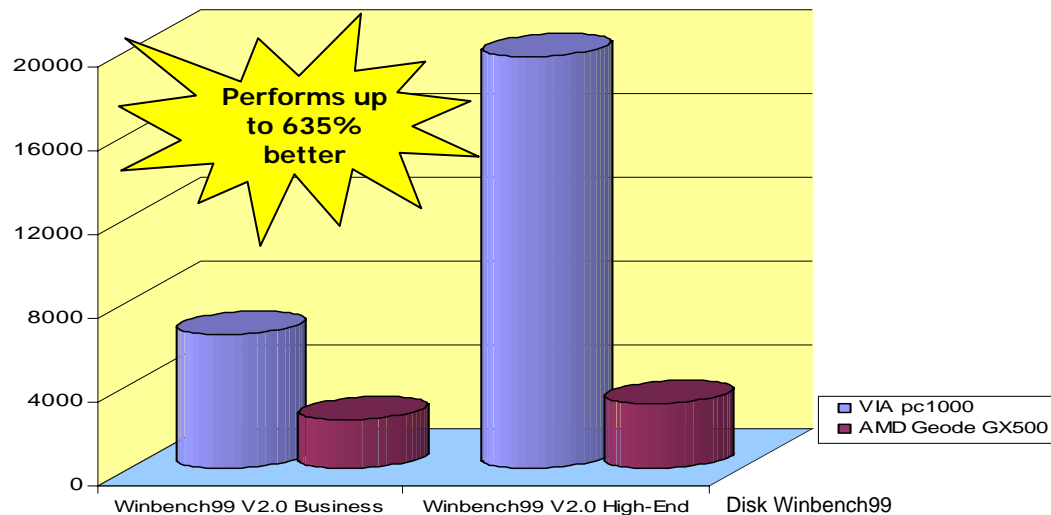
Functionality & Performance

Based on the VIA CoolStream™ Architecture, the VIA pc1000 processor comes packed with a host of advanced features including 128KB Level 1 and 64KB Level 2 cache, a 133MHz Front Side Bus, and 3DNow! and MMX™ extensions to deliver robust performance for all the most popular productivity, education, Internet, and entertainment applications.

The functionality of the VIA pc1000 Processor Platform is further enhanced by the advanced capabilities of the VIA CLE266 digital media chipset featuring the S3 Graphics UniChrome™ IGP (Integrated Graphics Processor) for advanced 2D/3D graphics performance and the built-in hardware MPEG-2 accelerator for smooth DVD playback. Other features include support for up to 1GB DDR266 SDRAM, dual ATA-133 IDE interfaces, six USB 2.0 ports, 10/100 Fast Ethernet for broadband networking, and six-channel AC'97 audio.

As can be seen from Figure 3 below, the VIA pc1000 Processor Platform delivers up to six times the performance of comparable platforms targeted at Emerging Markets using industry standard benchmarks.

Figure 3: VIA pc1000 Processor Platform Performance Comparison

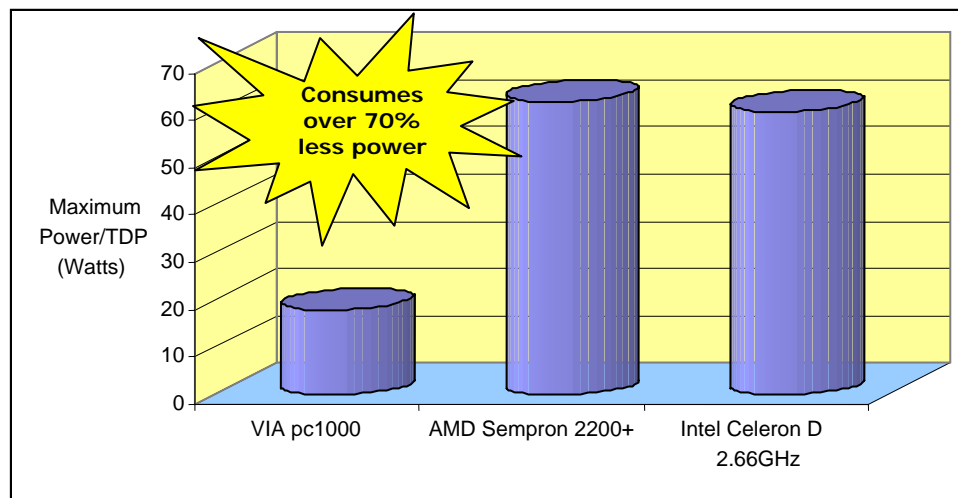


Energy Efficiency

With a TDP (Thermal Design Power) of only 18 watts and an idle power consumption of just 1.2 watts, the VIA pc1000 processor delivers almost unrivaled levels of energy efficiency in an advanced low profile EBGA package that requires minimal cooling. This not only maximizes product reliability and longevity, but also minimizes the Total Cost of Ownership of the system through the reduced consumption of electricity.

Figure 4 below compares the power consumption of the VIA pc1000 processor with that of comparable processors targeted at Emerging Markets. As can be seen, the VIA pc1000 processor consumes at least three times less power than competing processors.

Figure 4: VIA pc1000 Processor Platform Power Draw Comparison



VIA pc1500 Processor Platform

Introduction

Combining the enhanced performance and built-in security features of the VIA pc1500™ processor with the advanced functionality of the VIA CLE266 digital media chipset, the VIA pc1500 Processor Platform provides an ideal solution for powering a broad spectrum of Intrepid Computing devices, including Power Saving PCs, Mini-PCs, PHD Appliances, and PHD Server Appliances for developed, emerging, and harsh environments.

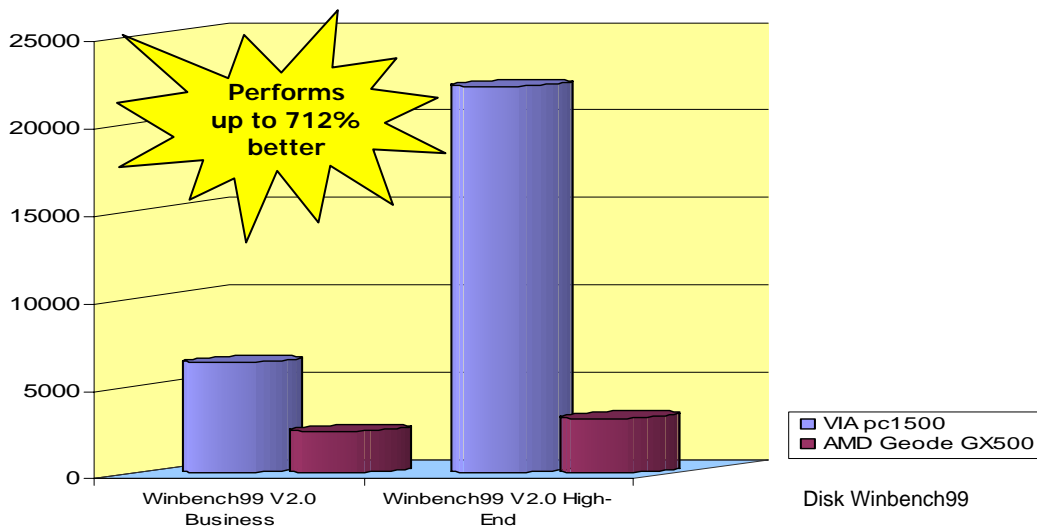
Functionality and Performance

The VIA pc1500 processor complements an extremely energy efficient design with advanced performance features within the StepAhead™ Technology Suite, including advanced branch prediction, an efficiency-enhanced 64KB full-speed exclusive L2 cache with 16-way associativity, and a full-speed FPU to provide all the necessary performance for running even the most demanding applications. To ensure a safe connected computing experience, it also comes with built-in advanced security features within the integrated VIA PadLock Security Engine, including support for military-grade AES encryption and dual quantum random number generators.

The functionality of the VIA pc1500 Processor Platform is further extended by the sophisticated capabilities of the VIA CLE266 digital media chipset featuring the VIA UniChrome™ IGP (Integrated Graphics Processor) for enhanced 2D/3D graphics performance, and built-in hardware MPEG-2 decoding for smooth DVD playback. There's also support for up to 1GB DDR266 SDRAM, dual ATA-133 IDE interfaces, six USB 2.0 ports, 10/100 Fast Ethernet, and six-channel AC'97 audio.

As can be seen from Figure 5 below, the VIA pc1500 Processor Platform delivers up to six times the performance of comparable platforms targeted at Emerging Markets using industry standard benchmarks.

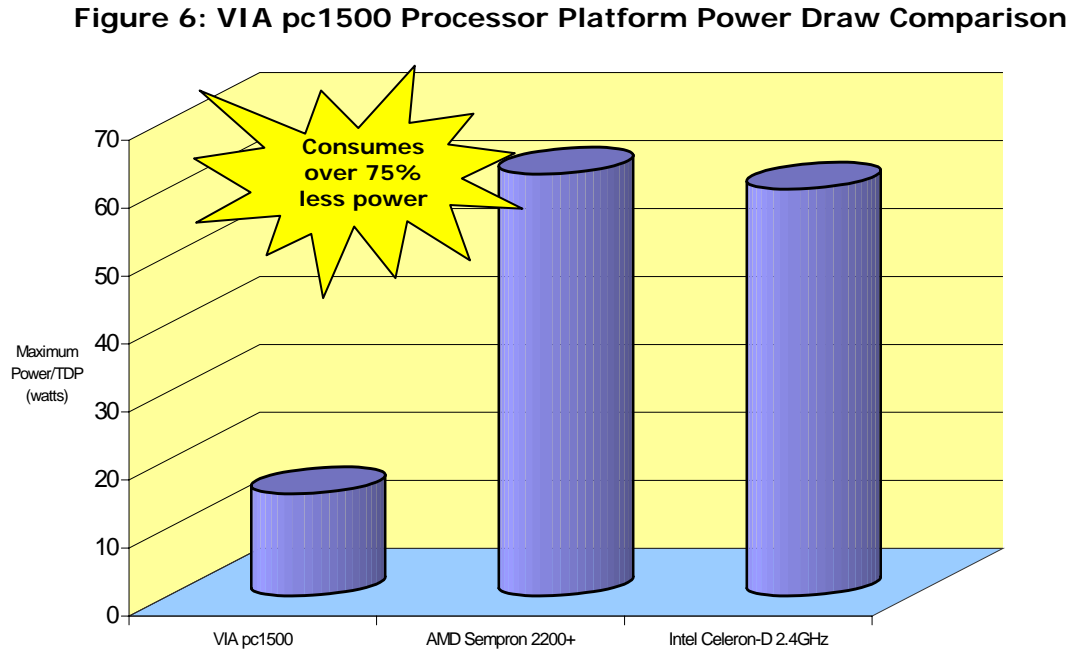
Figure 5: VIA pc1500 Processor Platform Performance Comparison



Energy Efficiency

Delivering a TDP of just 15 watts and an idle power consumption of 1.6 watts, the VIA pc1500 processor is one of the most energy-efficient CPUs on the market, not only ensuring maximum reliability and longevity, but also minimizing the Total Cost of Ownership.

As can be seen in Figure 6 below, the VIA pc1500 Processor consumes over 75% less power than comparable processors targeted at Emerging Markets.



VIA pc-1 Intrepid Computing Reference Designs

Introduction

As part of the VIA pc-1 System Platform Architecture, VIA has also developed a series of VIA Intrepid Computing Reference Designs to reduce development costs and speed up time to market for OEMs, System Integrators, and Broadband Providers planning to introduce Intrepid Computing devices in Emerging Markets.

To ensure maximum flexibility in tailoring products to meet the diverse needs of Emerging Markets, the VIA Intrepid Computing Reference Designs are designed from the ground up to allow the creation of a broad spectrum of devices with different configurations and price points. They are also available in a variety of form factors, and offer multiple customization options, and can be provided in a broad spectrum of configurations depending on the needs of the customer.

VIA pc-1 Power Saving PC Reference Design

The VIA Power Saving PC Reference Design is a robust, energy-efficient, full-featured multimedia PC that provides Emerging Market households, corporations, schools, and other organizations, as well as Internet Cafés and Village Kiosks, with a highly reliable complete system at prices below \$300.

Figure 7: VIA Power Saving PC Reference Design



Powered by a choice of VIA pc-1 Processor Platforms, the VIA Power Saving PC Reference Design comes equipped with a Hard Drive, 15" monitor, and a full set of connectivity and multimedia features, and runs a choice of operating systems and

applications, including Microsoft® Windows® XP, Microsoft® Windows® XP Starter Edition, and popular versions of Linux.

VIA pc-1 PHD Appliance Reference Design

The VIA pc-1 PHD Appliance Reference Design enables the creation of an entirely new category of Intrepid Computing devices that move one step beyond the traditional PC and optimize it for Community Access and Assisted Access usage scenarios such as schools, Internet Cafes, and Village Kiosks.

Figure 8: VIA PHD Appliance Reference Design



Combining a sleek yet rugged chassis with fanless, cool-running operation, the VIA pc-1 PHD Appliance Reference Design provides a highly reliable and energy efficient solution that overcomes the challenges of power, heat, and dust to ensure that it can withstand even the most demanding environmental and climatic conditions. For areas where there is intermittent electricity supply, the VIA pc-1 PHD Appliance Reference Design can be hooked up to a car battery and operate for up to 20 hours. With its versatile design, the VIA pc-1 PHD Appliance Reference Design can also be customized as a Wireless Mesh Server Appliance or Broadcast Server Appliance through the addition of the appropriate peripherals and software.

VIA pc-1 Initiative: The Right Path for Enabling the Next Billion

Through the VIA pc-1 Initiative and its Intrepid Computing Vision, VIA is creating a sustainable and highly scalable VIA pc-1 System Platform Architecture that combines the traditional strengths of the industry standard x86 infrastructure, namely its unrivaled compatibility, flexibility, functionality, and economies of scale, with ultra low power consumption and rich levels of feature integration to take computing technologies beyond the traditional confines of the PC into new markets, new environments, new usage models, and new product categories.

With this evolutionary yet innovative approach, VIA is leading the industry on the right path to expanding PC and Internet usage and bringing the benefits of ICT (Information and Communication Technologies) to the next billion.